detector for further deflecting the light back to laterally scatter through the shared waveguide 12f.

Another control layer 94g, Fig. 8 can be fabricated directly on CMOS layer 50g to redirect the radiation by 90 degrees leaving emitters 14g and 16g and returning to detectors 18g and 20g as shown more clearly in Fig. 9 where the redirection of light is achieved by the control structure and scattering by the shared waveguide. The underside 130 of layer 94g may be a reflective material or may be coated with a reflective material, for example, a metal such as silver to enhance its reflective properties. Although control layer 94g is shown as being fabricated on the CMOS layer 50g, it may also be fabricated directly on the shared waveguide.

Although specific features of the invention are shown in some drawings and not in others, this is for convenience only as each feature may be combined with any or all of the other features in accordance with the invention. The words "including", "comprising", "having", and "with" as used herein are to be interpreted broadly and comprehensively and are not limited to any physical interconnection. Moreover, any embodiments disclosed in the subject application are not to be taken as the only possible embodiments.

Other embodiments will occur to those skilled in the art and are within the following claims:

What is claimed is:

1. An intra chip or intra mutli-chip module on a shared substrate multi-wavelength optical communication system comprising:

a number of emitters each of which emits radiation at a different wavelength;

a plurality of detectors each of which senses radiation at a different wavelength corresponding to the radiation from one of said emitters; and

a shared waveguide on the same substrate including a scattering medium for transmitting emitted radiation to said detectors.

2. The multi-wavelength optical communication system of claim 1 in which said emitter includes a vertical cavity surface emitting laser.

3. The multi-wavelength optical communication system of claim 1 in which said emitter includes a scattering grating for redirecting the emitted radiation laterally through said shared waveguide.

4. The multi-wavelength optical communication system of claim 1 in which a said detector includes a filter for selectively passing one of said wavelengths from said emitters.

5. The multi-wavelength optical communication system of claim 4 in which

said filter includes a Bragg grating.

6. The multi-wavelength optical communication system of claim 1 in which said shared waveguide scatters the lateral leakage radiation from said emitters.

7. The multi-wavelength optical communication system of claim 1 in which said emitter includes an LED.

8. The multi-wavelength optical communication system of claim 1 in which said emitter includes an edge emitting laser.

9. The multi-wavelength optical communication system of claim 1 in which said emitter includes a reflector for redirecting the emitted radiation laterally through said shared waveguide.

10. The multi-wavelength optical communication system of claim 1 in which said emitters and detectors are disposed in a generally planar array.

11. The multi-wavelength optical communication system of claim 10 in which said shared waveguide is generally planar.

12. The multi-wavelength optical communication system of claim 1 in which said emitters and detectors are disposed on a chip.

13. The multi-wavelength optical communication system of claim 12 in which said chip is gallium arsenide.

14. The multi-wavelength optical communication system of claim 1 in which said chip is flip-chip bonded to a silicon chip.

15. The multi-wavelength optical communication system of claim 1 in which said shared waveguide is disposed on an integrated circuit chip to provide intrachip communications.

16. The multi-wavelength optical communication system of claim 1 in which said shared waveguide is disposed part on one integrated circuit chip and part on another integrated circuit chip to provide interchip communication.

17. The multi-wavelength optical communication system of claim 1 in which shared waveguide includes a reflective medium for containing the scattering radiation.

18. The multi-wavelength optical communication system of claim 17 in which a reflective medium is a lower index of refraction from the waveguide.

19. The multi-wavelength optical communication system of claim 1 in which

said shared waveguide is disposed part on a plurality of chips mounted on a common substrate to provide interchip communication.

20. The multi-wavelength optical communication system of claim 1 further including an opaque barrier for absorbing the radiation.